इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 13256 (1992): Air Compressor Lubricants - Types DAA and DAB [PCD 3: Petroleum, Lubricants and their Related Products]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

IS 13256 : 1992

(Reaffirmed 2004)

भारतीय मानक

वायु संपीडक स्नेहकों — डी ए ए और डी ए बी प्रकार — विशिष्टि

Indian Standard

AIR COMPRESSOR LUBRICANTS — TYPES DAA AND DAB — SPECIFICATION

UDC 621·892·094 : 621·51

© BIS 1992

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

January 1992

Price Group 3

Lubricants and Related Products Sectional Committee, PCD 4

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Lubricants and Related Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

The primary function of an oil in an air compressor is to lubricate cylinders, bearings and valves of reciprocating compressors and timing gears of rotary compressors. In these compressors (both stationary and portable types) the lubricants is exposed to compressed air at elevated temperatures possibly in the presence of catalytic materials. Under these adverse conditions, oil should not undergo any oxidation and form carbon deposits either on valves or on compressors elements. The oil shall maintain strong oil film to prevent metal to metal contact and minimize friction and wear. The lubricating oil shall also strongly resist displacement of oil by water and thus protect metal surfaces from contact with water and air.

Considerable assistance has been derived from DIN 51506 : 1985 'Lubricants, VB and VC Lubricating Oils with and without additives and VDL Lubricating Oils; Classification and Requirements' issued by Deutsches Institut für Normung (DIN), Germany.

The DAA type oils are intended for use in compressors operating intermittantly which allows cooling between periods of operation, for example 5 minutes continuous running in 20 minutes and also for use in compressors operating continuously with water cooling where the discharge air temperature are below 140°C and the stage pressure ratios are less than 3 : 1.

The DAB type oils are intended for use in compressors operating intermittantly but without sufficient time for cooling between periods of operation and also for use in compressors operating continuously where discharge air temperature are above 140°C or the stage pressure ratios are greater than 3 : 1.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AIR COMPRESSOR LUBRICANTS — TYPES DAA AND DAB — SPECIFICATION

1 SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for air compressor lubricants of mineral oil type having good oxidation resistance and corrosion preventing ability for air compressor application.

1.2 These oils are intended for use in reciprocating air compressors with lubricated compression cylinders and also for rotary drip-feed air compressors.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
1447 : 1966	Methods of sampling of petroleum and its products
1448	Methods of test for petroleum and its products

3 GRADES

3.1 The oils shall be of five viscosity grades as prescribed in Table 1.

4 REQUIREMENTS

4.1 The oils shall be blended using mineral oils and additives as required. It shall be bright and clear and shall be free from water, sediments and suspended impurities.

4.2 The material shall also comply with the requirements given in Table 1.

5 PACKING AND MARKING

5.1 Packing

The material shall be packed in metal or any other suitable container as agreed between the purchaser and the supplier.

5.2 Marking

The containers shall be marked with the following information:

a) Indication of the source of manufacture;

b) Type and grade;

c) Mass of the material;

d) Recognized trade-mark, if any; and

e) Identification in code No. or batch No.; otherwise to enable the consignment or manufacture to be traced back.

6 SAMPLING

6.1 Representative samples of the material shall be drawn as prescribed in IS 1447 : 1966.

6.2 Number of Tests and Criteria for Conformity

For the purpose of examining the conformity of a lot to the requirements of this specification, individual samples should be tested for viscosity, flash point and composite sample for the rest of the characteristics.

Table 1 Requirements for Air Compressor Lubricants—Types DAA and DAB

(*Clause* 4.2)

Sl No.	Characteristic	Requirements										Methods of Test, Ref to IS 1448
		DAA					DAB					
		Grade VG 32	Grade VG 46	Grade VG 68	Grade VG 100	Grade VG 150	Grade VG 32	Grade VG 46	Grade VG 68	Grade VG 100	Grade VG 150	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
i)	Kinematic viscosity											[P : 25]
	a) At 40°C, mm^2/s	28·8-35·2	41·4-50·6	61·2-74·8	90-110	135-165	28·8-35·2	41·4-50·6	61·2-74·8	90-110	135-165	
	b) At 100°C, mm^2/s	Report					Report					
ii)	Flash point, °C, *Min*	190	190	190	200	200	190	190	190	200	200	[P : 69]
iii)	Pour point, °C, *Max*	−9	−9	−9	−6	−6	−9	−9	−9	−6	−6	[P : 10]
iv)	Copper strip corrosion, at 100°C, 3 hours, *Max*	1	1	1	1	1	1	1	1	1	1	[P : 15]
v)	Total acid number, mg KOH/g	Report					Report					[P : 2]
vi)	Emulsion characteristic, *Max*	40-37-3 (30)					40-37-3 (30)					[P : 91]
vii)	Rust preventing characteristic	Report					Pass Test A					[P : 96]
viii)	Oxidation test at 200°C for 2×6 hours											
	a) Increase in CCR after ageing, percent, *Max*	1·5	1·5	1·5	2·0	2·0	Report					[P : 65]
	b) Evaporation loss, percent, *Max*	15	15	15	15	15	Report					[P : 65]
ix)	Oxidation test at 200°C for 21 hours or 4×6 hours in the presence of ferric oxide											
	a) Increase in CCR after ageing, percent, *Max*	Report					2·5	2·5	3·0	3·0	3·0	Annex A
	b) Evaporation loss, percent, *Max*	Report					20	20	20	20	20	Annex A
x)	Properties of 20 percent residue from the distillation under vacuum											[P : *]
	a) CCR, percent, *Max*	Report					0·3	0·3	0·3	0·3	0·6	[P : 8]
	b) Ratio of viscosity at 40°C to that of new oil, *Max*	Report					5	5	5	5	5	[P : 25]

*Under preparation till such time, ASTM D 1160 may be followed.

NOTE — The tests at Sl No. (viii), (ix) and (x) should be taken as 'TYPE TEST' till an alternate test method of short duration oxidation test is arrived at.

ANNEX A

[*Table* 1, *Sl No.* (ix)]

OXIDATION TEST

(Adapted from DIN 51352 : 1985 issued by Deutsches Institut Für Normung, Germany)

A-0 GENERAL

The method prescribes a test procedure to determine the ageing characteristics of lubricating oils by passing air in the presence of iron oxide.

The requirements specified in this method are applicable to such petroleum based lubricating oils where the loss by evaporation during the test is not more than 20 percent by mass.

A-1 OUTLINE OF THE METHOD

After adding ferric oxide as a catalyst, the sample is aged for 24 h by passing air through it at a temperature of 200°C. The Conradson carbon residue of the aged sample is determined in accordance with IS 1448 [P : 122] : 1987. In addition, the evaporation loss occurring during the test is determined as described in **A-7.3** and compared with the requirements specified in **4**.

A-2 SIGNIFICANCE

When tested in accordance with this method, a lubricating oil is characterized by the value of the Conradson carbon residue of the oil after ageing by passing air through it in the presence of ferric oxide.

The seemingly higher Conradson carbon residue resulting from the presence of iron oxide in the lubricating oil is to be taken into account during the evaluation.

A-3 APPARATUS

A-3.1 Test Apparatus

The test apparatus (*see* Fig. 1) shall consist of an ageing vessel and an insert fitted with an air inlet tube and vent tube. All components shall be made of borosilicate glass.

A-3.1.1 *Ageing Vessel*

The ageing vessel shall be made of glass tubing and shall be fused with a socket joint.

A-3.1.2 *Temperature Measuring Vessel*

The temperature measuring vessel shall be made as described in **A-3.1.1** but shall have no socket joint.

A-3.1.3 *Insert Fitted with Air Inlet Tube and Vent Tube*

The air inlet tube made of glass tubing shall be fused into the insert as illustrated. There shall be a space of 1·0 ± 0·5 mm between the centrally inserted air inlet tube and the bottom of the ageing vessel. The ageing vessel and its insert shall be marked to ensure that this space is always maintained.

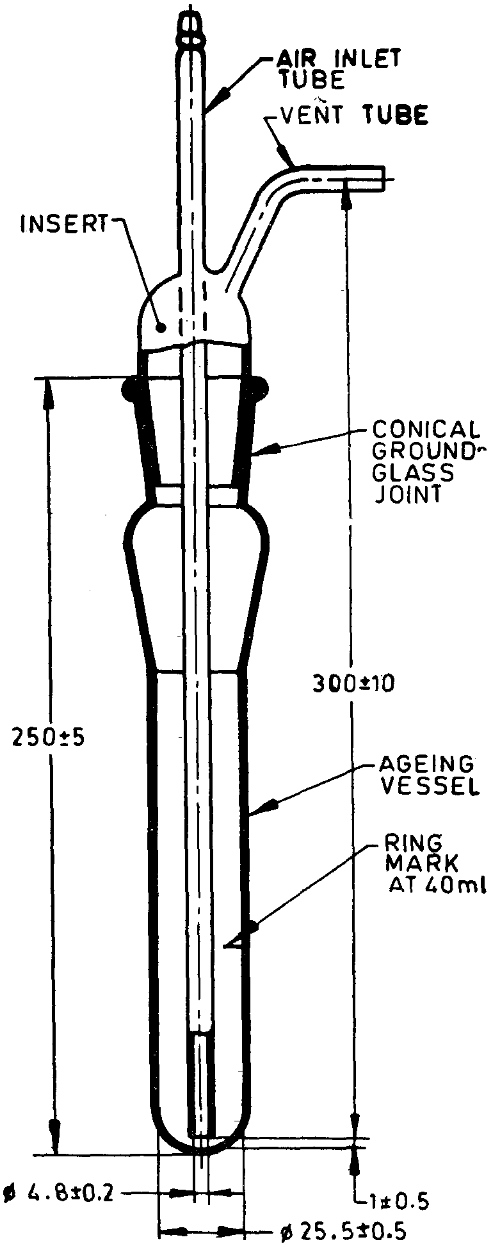
A-3.2 Heating Device

Oil bath fitted with stirrer and top, thermostatically controlled and with good insulation. The effect of the stirrer and control shall be such that the temperature of the sample is maintained at 200 ± 1°C. At this temperature, the oil in the bath shall reach a level of 13 mm below the top.

The temperature shall be measured in another ageing vessel without socket joint and air inlet tube (for temperature measuring vessel) (*see* **A-3.1.2**). With the oil level at a height of 110 mm, using a calibrated thermometer as specified in **A-3.3**.

A support shall be fitted in the oil bath for the ageing vessel so that the latter is immersed 140 mm in the oil. The top cover of the oil bath shall be provided with wells which are just large enough to accommodate one ageing vessel each. In order to protect that part of the ageing vessel projecting from the bath and the thermometer from any draught, the walls of the oil bath shall project approximately 150 mm above the top. Instead of this, a protective hood may be fitted to the top at this height.

A metal block may also be used as the heating device as long as it is ensured that the temperature of the oil in the ageing vessel is maintained



All dimensions in millimetres.

FIG. 1 TEST APPARATUS FOR DETERMINING THE AGEING CHARACTERISTICS LUBRICATING OILS

at 200 ± 1°C in each well designed for accommodating an ageing vessel. As in the oil bath, the temperature shall be controlled in the temperature measuring apparatus. A 150 mm high protective hood shall be fitted to the metal block to protect against draughts.

NOTE — In order to improve heat transfer, the space between the wells in the metal block and the ageing vessel may be filled with an appropriate silicone oil.

A-3.3 Thermometer

Conforming to the requirements of IP 22C Oxidation Thermometer of Institute of Petroleum, London or its equivalent.

A-3.4 Air Supply Components

A-3.4.1 Drechsel gas washing bottle of 500 ml capacity, fitted with a washing bottle insert without glass filter, for example, washing bottle fitted with glass wool.

A-3.4.2 Pressure stabilizer glass tubing, approximately 120 cm long, closed at the bottom, filled with a glycerine/water mixture (two parts by volume of glycerine and one part by volume of water), height of liquid column approximately 100 cm.

Glass T-piece, made of glass tubing, the vertical section of which is approximately 120 cm long and is fitted with a slotted cork to support the T-piece.

A-3.4.3 Flowmeter with an average measuring range to cope with a flow rate of approximately 15 l/h, calibrated for air at 20°C, with maximum error limits of 0·25 l/h. One flowmeter shall be provided for each ageing vessel.

A-3.4.4 Flowmeter

Soap bubble flowmeter of 150 ml capacity and 1 ml scale division, or any other suitable flowmeter.

A-3.5 Electrically heated muffle furnace, capable of being adjusted to a temperature of 775 ± 25°C.

A-3.6 High speed dispersion apparatus:

- speed: about 20 000 min^{-1};
- peripheral speed: 13 m/s;
- shaft length: 200 mm;
- shaft diameter: about 18 mm.

A-4 REAGENTS

A-4.1 Analytical grade acetone (2-propanone)

A-4.2 Chromosulphuric Acid

Prepared by dissolving 50 g of potassium dichromate ($K_2Cr_2O_7$) in one litre of conc. sulphuric acid (percentage by mass (H_2SO_4) = 96 percent, density = 1·84 g/ml). The solution shall be stored in ground glass bottles fitted with ground-in glass stoppers.

A-4.3 Oil-free Air — for example, from a compressed gas cylinder.

A-4.4 Analytical Grade Ferric Oxide (Fe_2O_3) — not less than 99 percent (*m/m*).

A-5 SAMPLING

Sampling shall be carried out as per **6.1.**

A-6 PREPARATION OF APPARATUS

Thoroughly clean the ageing vessels and their inserts using cleansing agents usually employed in laboratories, and dry them in an oven. In the case of very stubborn incrustations, it may be necessary to use chromosulphuric acid. After removal of the chromosulphuric acid, rinse the ageing vessels with the tap water and then with deionized water until the water shows no further sign of acid reaction. Then, dry as described above.

Adjust the heating device so that a temperature of 200 ± 1°C is maintained in the temperature measuring vessel.

A-7 PROCEDURE

A-7.1 Carry out two determinations.

A-7.2 Ageing

At an ambient temperature of 18 to 28°C, pour approximately 1/3 of the sample into the ageing vessel. Then add 0·4 ± 0·005 g of ferric oxide. Mix ferric oxide and the oil by tapping the vessel with the hand. Then, fill the vessel with the sample up to the 40 ml mark and disperse the ferrous oxide uniformly throughout the oil sample using the high-speed dispersion apparatus for 30 s. Then, allow the drips to run off the stirring rod for 10 s.

To determine the evaporation loss as described in **A-7.3**, weigh the ageing vessel together with the sample and the fitted air inlet tube to the nearest 0·1 g. Then, place the ageing vessel in the heating device and immediately begin to pass the air stream at a rate of 15 ± 0·25 l/h through the sample. Let off the air stream bubble through the sample for 24 h. Then shut off the air stream and remove the ageing vessel together with air inlet tube from the heating device.

A-7.3 Evaporation Loss

Check the evaporation loss of the oil by weighing at ambient temperature and compare with the limiting value indicated in **A-0**. If the density of the test oil is unknown or cannot be established, assume a density of 0·900 g/ml.

A-7.4 Determination of the Conradson Carbon Residue and the Mass of Ferric Oxide

Determine the Conradson carbon residue of the aged samples as described in IS 1448 [P : 122] : 1987. Immediately before determining the carbon residue, scrap off the ferric oxide deposited on the bottom of the ageing vessel using a rounded glass rod of about 6 mm in diameter, and mix ground glass stoppers and homogenize the contents by shaking for one minute.

If the aged samples are too viscous, before determining the Conradson carbon residue, heat them in a water at 100°C for 20 minutes and then homogenize. Immediately after homogenization, pour approximately 5 g of the hot sample in the weighed Conradson crucible, place it in the desiccator and allow to cool down to ambient temperature. Then, weigh the crucible and carry out the Conradson determination as described in IS 1448 [P : 122] : 1987.

After reweighing the Conradson crucible to determine the residue, ignite the crucible containing the residue in a muffle furnace for 2 h at 775 ± 25°C. After cooling down to ambient temperature in a desiccator, determine the mass of ferric oxide.

NOTE — If the aged samples exhibit and appreciable loss of oil from frothing during the Conradson determination, use smaller amounts. Indicate these amounts and the results in the test report.

A-8 EVALUATION

Calculate the Conradson carbon residue (CCR) of the aged sample as a percentage by mass *M* (CCR) using the following equation:

$$(\text{ CCR }),\ \text{percent by mass} = \frac{m_2 - m_3}{m_1 - m_3} \times 100$$

where

m_1 = the initial mass of sample, in g, used for determining the carbon residue;

m_2 = the mass of the carbon residue, in g, including ferric oxide; and

m_3 = is the mass of ferric oxide, in g, after glowing away of carbon residue.

Determine the mean of the results obtained from the carbon residue determination of the two aged samples.

A-9 EXPRESSION OF RESULT

The carbon residue shall be given as the result of determination in percent (*m*/*m*), rounded to the nearest 0·05 percent, with reference to this method.

A-10 PRECISION

A-10.1 The results of the duplicate tests shal not differ by more than the following amountsl:

Repeatability	*Reproducibility*
20 percent of mean value	40 percent of mean value

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publication), BIS.

Revision of Indian Standards

Indian Standards are reviewed periodically and revised, when necessary and amendments, if any, are issued from time to time. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition. Comments on this Indian Standard may be sent to BIS giving the following reference :

Doc : No. PCD 4 (394)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters :
Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75
Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices : Telephones

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg, 331 01 31
NEW Delhi-110002 331 13 75

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola
CALCUTTA 700054 37 86 62

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036 53 38 43

Southern : C.I.T. Campus, IV Cross Road, MADRAS 600113 412916

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 400093 6 32 92 95

Branches : AHMADABAD, BANGALORE, BHOPAL, BHUBANESHWAR,
COIMBATORE, FARIDABAD, GHAZIABAD, GUWAGATI,
HYDERABAD, JAIPUR, KANPUR, PATNA, THIRUVANANTHAPURAM.

Printed at Swatantra Bharat Press, Delhi, India